(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: 0 133 845
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 84830232.9

(22) Date of filing: 31.07.84

(51) Int. Cl.⁴: F 04 D 29/28

(30) Priority: 01.08.83 IT 6783383

(43) Date of publication of application:
06.03.85 Bulletin 85/10

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: CORAL S.p.A.
Strada Volpiano 52
I-10040 Leini (Torino)(IT)

(72) Inventor: Coral, Erminio
c/o Coral S.P.A. Strada Volpiano 52
I-10040 Leini(Torino)(IT)

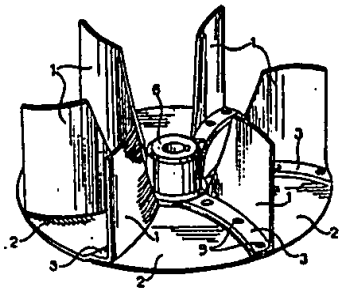
(74) Representative: Jacobacci, Filippo et al,
c/o JACOBACCI-CASETTA & PERANI S.n.c. Via Alfieri, 17
I-10121 Torino(IT)

(54) Rotor for centrifugal compressors and fans.

(57) A rotor for centrifugal compressors and fans, of the type comprising a ring of blades (1) connected to a central hub (6) with an annular flange (7), is formed simply and economically by providing the root of each blade (1) with an integral appendage (2) which lies in a plane perpendicular to the axis of rotation and fixing the appendage (2) of each blade (1) to both the appendage of one of the blades adjacent thereto and to the flange (7) of the hub (6).

Each blade (1) and its appendage (2) are conveniently made by pressing from sheet metal and the form of the appendages (2) is such that together they constitute a disc for a rotor of the semi-closed type or one of the discs for a rotor of the closed type.

FIG. 5



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Croydon Printing Company Ltd

Rotor for centrifugal compressors and fans

The present invention relates to rotors for centrifugal compressors and fans of the type comprising a ring of blades connected to a central hub having an annular flange.

The object of the invention is to provide a rotor of the type specified above, which requires a smaller number of parts for its manufacture than is required at present so as to render it simpler and cheaper to produce.

In order to achieve this object, the rotor which is the subject of the present invention is characterised in that each blade has at its root an integral appendage lying in a plane perpendicular to the axis of rotation, and in that the appendage of each blade is fixed both to the appendage of one of the blades adjacent thereto and to the flange of the hub.

Further characteristics and advantages of the present invention will become apparent from the detailed description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a plan view of a rotor for centrifugal compressors or fans,

Figure 2 is a section taken on the line II-II of Figure 1,

Figure 3 is a section taken on the line III-III of Figure 1,

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Figure 4 is a perspective view of a blade of the rotor, and

Figure 5 is a perspective view of the rotor illustrated in Figures 1 to 4.

In the example illustrated the rotor blades, indicated 1, are cylindrical with generatrices parallel to the axis of rotation.

As its root, each of the blades 1 has an integral appendage 2 lying in a plane perpendicular to the axis of rotation.

The appendage 2 is conveniently formed in one piece with the respective blade 1 by pressing from sheet metal.

The appendage 2 has two side edges 2a, 2b with circular profiles concentric with the axis of rotation, and an end edge 2c having a concave profile with a curvature equal to that of the blades 1.

The appendage 2 has a raised part 3 close to the root of the respective blade 1.

The appendage 2 also has a series of holes 4 close to the end edge 2c and a series of holes 5 in correspondence with its raised part 3.

During assembly of the rotor, that part of each appendage 2 adjacent the end edge 2c is located beneath the raised part 3 of the appendage of the blade adjacent thereto.

The rotor hub, indicated 6, is provided with a flange 7 having a ring of holes 8. The appendages of two adjacent blades are connected together by rivets 9 which pass through the holes 4 and 5, and by longer rivets 10 which pass through the radially innermost holes 4 and 5 and through the holes 8 in the flange 7 of the hub 6, thus connecting the blades to the hub without the need for intermediate elements.

More particularly, in the case of rotors of the semi-closed type illustrated in the drawings, there is no need to use a disc to which, in the prior art, the blades are fixed and which is fixed in its turn to the flange of the hub.

The appendages 2 integral with the blades 1 in the rotor according to the present invention also fulfil the function of a disc for partly closing the rotor.

In the case of rotors of the closed type, it is possible to fix, for example by welding, a disc 11 with a centrally-flared aperture, such as that illustrated in Figure 2, to the edges 2d of the blades 1 opposite the roots.

According to a variant not illustrated, a rotor of the closed type could be formed by providing each blade with an integral appendage located at the opposite end to the root and lying in a plane perpendicular to the axis of rotation, for connecting together the appendages of adjacent blades in order to fulfil the function of the aperture disc indicated 11 in Figure 2.

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The connection between the roots of the blades and the flange of the hub could be achieved in this case either by the conventional method, that is, by means of a disc fixed to both the roots of the blades (which lack orthogonal appendages) and to the flange of the hub, or, more advantageously, by again providing each blade with integral appendages at their roots, as described above.

Naturally, the principle of the invention remaining the same, the constructional details and embodiments of the rotor could be varied widely with respect to that described and illustrated purely by way of non-limiting example, without thereby departing from the scope of the present invention.

Thus, for example, the connection between the appendages 2 of the blades 1 and the flange 7 of the hub 6 could be achieved by bolts or other connecting means which allow easy replacement of the blades in the event of breakage thereof during operation of the rotor, instead of by rivets.

Alternatively, the said connection could be achieved by welding.

CLAIMS

1. Rotor for centrifugal compressors and fans, comprising a ring of blades connected to a central hub having an annular flange, characterised in that each blade (1) has at its root an integral appendage (2) which lies in a plane perpendicular to the axis of rotation, and in that the appendage (2) of each blade (1) is fixed both to the appendage (2) of one of the blades (1) adjacent thereto and to the flange (7) of the hub (6).

2. Rotor according to Claim 1, characterised in that the appendage (2) of each blade (1) has a raised portion (3) close to the root of the blade, below which is located the free end of the appendage (2) of the blade (1) adjacent thereto, and in that the appendages (2) are fixed together and to the flange (7) of the hub (6) in correspondence with these raised portions (3).

3. Rotor according to Claim 1, characterised in that the appendage (2) of each blade (1) has a series of holes (5) close to its raised part (3) and a series of holes (4) close to its free end (2c), the holes (4,5) being used partly for the passage of means (9) for fixing the appendages (2) of two adjacent blades (1) together and partly for the passage of means (10) for fixing the two appendages (2) together and to the flange (7) of the hub (6).

4. Rotor according to Claim 3, characterised in that the fixing means are constituted by rivets (9,10).

5. Rotor according to Claim 3, characterised in that the fixing means are constituted by bolts.

6. Rotor according to Claim 1, characterised in that the appendage (2) of each blade is formed in a single piece with the respective blade (1) and is fixed both to the appendage of one of the blades (1) adjacent thereto and to the flange (7) of the hub (6) by welding.

7. Rotor according to Claim 1, characterised in that the appendage (2) of each blade (1) is formed in a single piece with the respective blade by blanking and pressing from sheet metal.

8. Rotor according to Claim 1, characterised in that the appendage (2) of each blade (1) has two side edges (2a, 2b) with circular profiles concentric with the axis of rotation, whereby the assemblage of appendages (2) constitutes a disc with a central hole perpendicular to the axis of rotation and forms a rotor of the semi-closed type.

9. Rotor according to any one of Claims 1 to 8, characterised in that a disc (1) with a central aperture perpendicular to the axis of rotation is fixed to the edges (2d) of the blades (1) opposite their root edges to form a rotor of the closed type.

10. Rotor according to any one of Claims 1 to 8, characterised in that in correspondence with its edge (2d) opposite the root edge, each blade (1) has a second integral appendage connected to the appendage of one of the adjacent blades, and in that the assemblage of second appendages constitutes a second disc with a central hole parallel to the first disc whereby the rotor is of the closed type.

FIG. 1

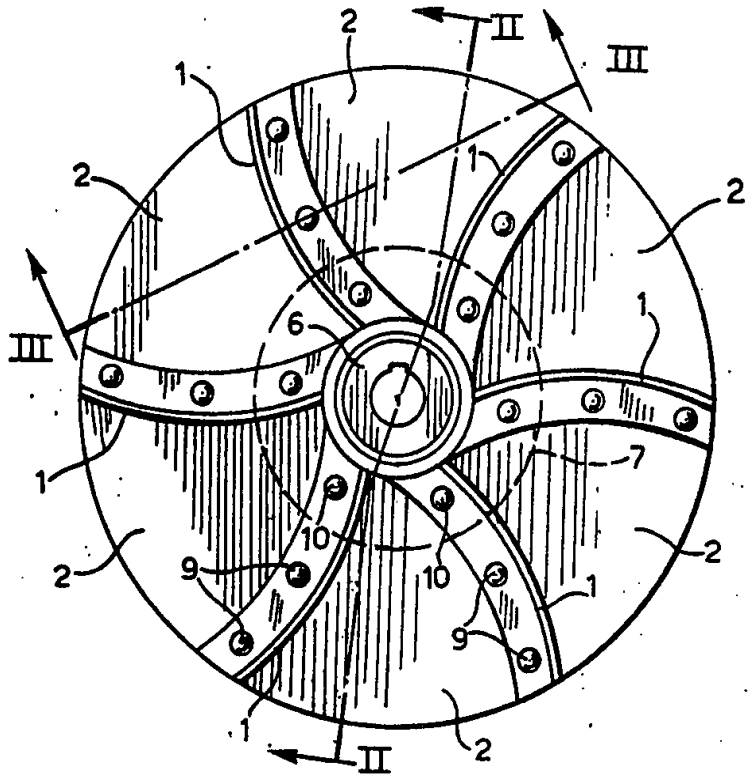

FIG. 2

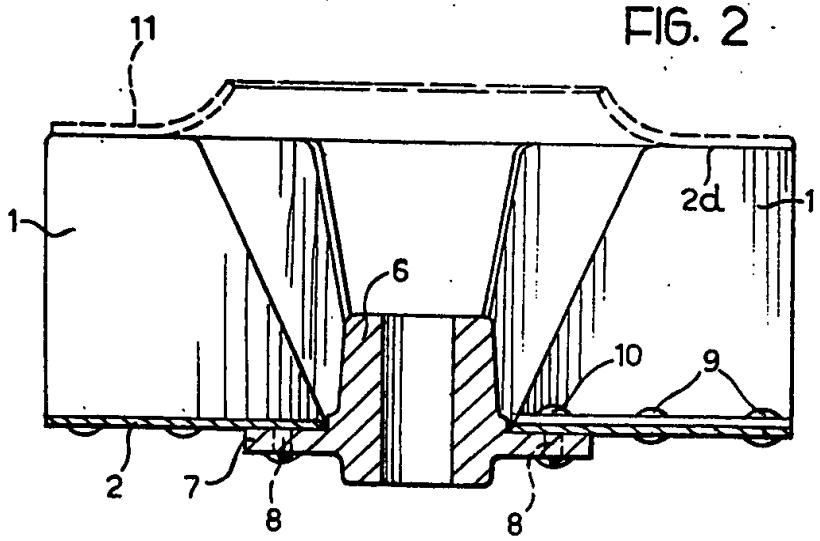

FIG. 4

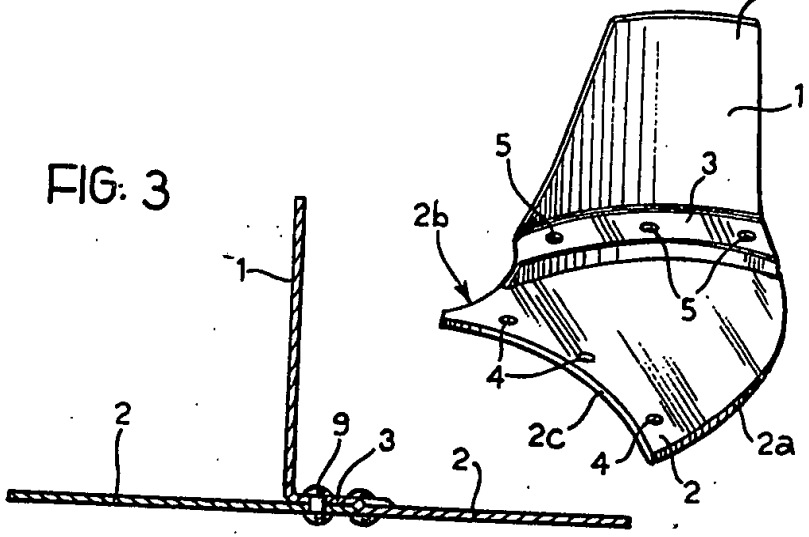

FIG. 3

FIG. 5